Claims

[c1] What is claimed is:

1.A voltage-controlled capacitor circuit having a first output end and a second output end for forming a capacitor between the first output end and the second output end, the voltage-controlled capacitor circuit comprising:

a first varactor having two ends, wherein one end is connected to the first output end; the first varactor comprising a metal oxide semiconductor (MOS) transistor, having a source electrode and a drain electrode that are connected to one end of the first varactor, and a gate electrode that is connected to the other end of the first varactor; a first bias voltage being applied to one end of the first varactor and a first control voltage being applied to the other end of the first varactor; a capacitance between the two ends of the first varactor changing according to a difference between the first bias voltage and the first control voltage; and

a second varactor having two ends, wherein one end is connected to the second output end; the second varactor comprising a transistor electrically connected between the two ends of the second varactor for forming a PN-junction between the two ends of the second varactor; a second bias voltage being applied to one end of the second varactor and a second control voltage being applied to the other end of the second varactor; a capacitance between the two ends of the second varactor changing according to a difference between the second bias voltage and the second control voltage.

[c2] 2.The voltage-controlled capacitor circuit of claim 1 further comprising a capacitor with a constant capacitance electrically connected between one end of the first varactor and the first output end.

[c3] 3.The voltage-controlled capacitor circuit of claim 1 further comprising a capacitor with a constant capacitance electrically connected between one end of the second varactor and the second output end.

[c4] 4.The voltage-controlled capacitor circuit of claim 1 further comprising a capacitor with a constant capacitance electrically connected between the second output end and the end that is not connected to the first output end of the first

varactor.

[c5] 5.The voltage-controlled capacitor circuit of claim 1 wherein the first varactor is connected between the first output end and the second output end.

[c6] 6.The voltage-controlled capacitor circuit of claim 5 further comprising a capacitor with a constant capacitance electrically connected between the first varactor and the second output end.

[c7] 7.The voltage-controlled capacitor circuit of claim 1 wherein the second varactor is connected between the first output end and the second output end.

[c8] 8.The voltage-controlled capacitor circuit of claim 7 further comprising a capacitor with a constant capacitance electrically connected between the second output end and the second varactor.

[c9] 9.The voltage-controlled capacitor circuit of claim 1 wherein the second varactor is connected between the first varactor and the second output end.

[c10] 10.The voltage-controlled capacitor circuit of claim 9 further comprising a capacitor with a constant capacitance electrically connected between the second varactor and the second output end.

[c11] 11. The voltage-controlled capacitor circuit of claim 9 wherein the end of the second varactor that has the second control voltage applied is connected to the end of the first varactor that has the first control voltage applied.

[c12] 12.The voltage-controlled capacitor circuit of claim 1 wherein the voltage level of the first bias voltage is constant.

[c13] 13.The voltage-controlled capacitor circuit of claim 1 wherein the voltage level of the second bias voltage is constant.

[c14] 14.The voltage-controlled capacitor circuit of claim 1 wherein the voltage-controlled capacitor circuit is applied to a voltage-controlled oscillator.

[c15] 15.The voltage-controlled capacitor circuit of claim 14 wherein the voltage-controlled oscillator comprises:

an inductor electrically connected to the voltage-controlled oscillator;
an oscillating circuit electrically connected to the inductor for outputting an oscillating signal according to a resonance effect generated between the inductor and the voltage-controlled capacitor circuit.

[c16] 16. The voltage-controlled capacitor circuit of claim 1 wherein the transistor is a bipolar junction transistor connected as a diode.

[c17] 17. The voltage-controlled capacitor circuit of claim 1 wherein the transistor is a MOS transistor connected as a diode.

[c18] 18.An oscillator for providing an oscillating signal comprising:
a voltage-controlled capacitor circuit having a first output end and a second output end for forming a capacitor between the first end and the second end comprising:
a first varactor having two ends, wherein one end is connected to the first output end; the first varactor comprising a MOS transistor, having a source electrode and a drain electrode that are connected to one end of the first varactor, and a gate electrode that is connected to the other end of the first varactor; a first bias voltage being applied to one end of the first varactor and a first control voltage being applied to the other end of the first varactor; a capacitance between the two ends of the first varactor changing according to a difference between the first bias voltage and the first control voltage; and
a second varactor having two ends, wherein one end is connected to the second output end; the second varactor comprising a transistor electrically connected between the two ends of the second varactor for forming a PN-junction between the two ends of the second varactor; a second bias voltage being applied to one end of the second varactor and a second control voltage being applied to the other end of the second varactor; a capacitance between the two ends of the second varactor changing according to a difference between the second bias voltage and the second control voltage.

[c19] an inductor electrically connected to the voltage-controlled capacitor circuit;
an oscillating circuit comprising an oscillating input end for receiving an oscillating input signal, and an oscillating output end electrically connected to

the inductor and to the voltage-controlled capacitor circuit for changing a of the oscillating input signal according to a resonance effect generated between the inductor and the capacitor connected between the first input end and the second input end, and for feeding back the phase-changed oscillating input signal to the oscillating input end to generate the oscillating signal.

[c20] 19.The oscillator of claim 18 wherein the first varactor is connected between the first input end and the second input end.

[c21] 20.The oscillator of claim 19 further comprising a capacitor with a constant capacitance electrically between the second output end and the first varactor.

[c22] 21.The oscillator of claim 18 wherein the second varactor is electrically connected between the first output end and the second output end.

[c23] 22.The oscillator of claim 21 further comprising a capacitor with a constant capacitance electrically connected between the second output end and the second varactor.

[c24] 23.The oscillator of claim 18 wherein the second varactor is electrically connected between the first varactor and the second output end.

[c25] 24.The oscillator of claim 23 further comprising a capacitor with a constant capacitance electrically connected between the second varactor and the second output end.

[c26] 25.The oscillator of claim 23 wherein the end of the second varactor that has the second control voltage applied is connected to the end of the first varactor that has the first control voltage applied.

[c27] 26.The oscillator of claim 18 wherein the voltage level of the first bias voltage is constant.

[c28] 27.The oscillator of claim 18 wherein the voltage level of the second bias voltage is constant.